

ACKNOWLEDGMENTS

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ON THE NATURAL HISTORY OF CANOPIDAE (HETEROPTERA: PENTATOMOIDEA)

In moist regions of the Neotropics, the undersides of fallen trees are frequently coated with a layer of fungi which may be inhabited by a diverse assemblage of arthropods. While studying mycophagous Coleoptera in Costa Rica, Bolivia and Peru, I became acquainted with this unusual fauna which includes many heteropterous insects; some mycovores (e.g., Aradidae), other predators (e.g., Reduviidae). Among the familiar residents were some slow moving, shiny black, hemispherical pentatomoids. A few specimens collected from several locations were determined to be species of Canopidae, an infrequently collected family whose biology is unknown.

The Canopidae include eight Neotropical species, with some additional names based solely on immatures (Slater, 1982), all belonging to the genus *Canopus* Fabricius (McAtee and Malloch, 1928). The monogeneric family has affinities with Scutelleridae and could also be closely related to Megarididae (McDonald, 1979).

Canopidae were frequently encountered during these field trips; however, they were only collected a few times as part of general faunal samples. Although a wide variety of fungal taxa and life stages are typically available, Canopidae are usually found on sporophores of certain fungi (especially thin encrusting polypores) and are often present as both adults and immatures, suggesting that the association with fungi is not incidental. The following are data for 49 specimens representing two species of Canopidae (deposited in the Cornell University Insect Collection) collected by myself

and colleagues (Z. H. Falin, Q. D. Wheeler) who also study mycophagous insects in the Neotropics:

***Canopus burmeisteri* McAtee & Malloch**

BOLIVIA: Dpto. La Paz, San Lorenzo (12 km Caranavi), 1-2.I.91, on small brown shelf polypore on undersides of log, ex. *Polyporus phillipinensis* Berk., JVMIot#B91-16 (3 nymphs); on dark encrusting polypore on undersides of log, ex. *Antrodiella* sp., JVMIot#B91-36 (1 ♀), JVMIot#B91-42 (2 nymphs); on undersides of fungus-covered log, ex. *Earliella scabrosa* (Pers.) Gilbn. & Ryv., JVMIot#B91-46 (1 ♀, 2 nymphs). **PERU:** Dpto. Madre de Dios, Río Tambopata Res., 12.I.87, on large flat white polypore, JVMIot#87-177 (1 nymph); 13.I.87, on flat white polypore, JVMIot#87-136 (1 ♂, 2 ♀♀, 1 nymph); on large white polypore, JVMIot#87-135 (1 ♂, 1 ♀); 10.I.87, on polypore sheet fungus under log, QDWlot#87-061 (1 nymph); 12.I.87, on log at night, JVMIot#87-125 (1 nymph); 12.I.87, on polypore, JVMIot#87-089 (1 nymph); 16.I.87, ex. polypore on log in slash-burn area (1 nymph); Dpto. Amazonas, Río Marañón, 1 km downstream from Pongo de Requema, in stream gorge, 26.XII.90, on reddish brown encrusting polypore on underside of log, ex. *Porogramme lateritia* (Pat.) Pat., JVMIot#P90-33 (4 nymphs); on brown encrusting polypore on underside of log, JVMIot#P90-36 (1 ♂).

***Canopus fabricii* McAtee & Malloch**

COSTA RICA: Prov. Puntarenas, Las Alturas Bio. Station, Finca Las Alturas, nr. Cotón, 1,540 m, 17.V.92, on undersides of log, JVMIot#CR92-029 (1 ♂); 4.VI.92, on gray encrusting polypore on undersides of log, JVMIot#CR92-140 (3 ♂♂, 2 ♀♀, 3 nymphs); Corcovado N. P., Sirena Station, Pavo Trail, elev. 5 m, 3.VI.92, on sheet fungi on downed logs (9 nymphs); on shelf fungus on downed logs (1 nymph); Ollas Trail, elev. 75 m, 4.VI.92, on fungus-covered stump (1 ♂, 2 ♀♀); elev. 10 m, 6.VI.92, on sheet fungus at night (2 ♀♀).

Canopids were not the focus of interest during these field trips and, unfortunately, their feeding behavior was never observed. In an attempt to indirectly determine the feeding habits, gut content slides were prepared from three Costa Rican specimens. Considering that the known biology for pentatomoids includes only predation and phytophagy (sap-feeding on angiosperms) (Slater, 1982), it was surprising to find that each gut contained many fungal spores. The spores were of the same type that might be expected from the basidiocarp (a polypore) on which the bugs were observed.

The nature of the association between Canopidae and fungi-encrusted logs is not clear because the immediate source of the spores found in the digestive systems is unknown. Polypore spores have thick walls and may persist intact for some time in the gut of insects. It seems likely that members of Canopidae are obligately or facultatively mycophagous and ingest fungal material directly.—*Joseph V. McHugh, Department of Entomology, Cornell University, Ithaca, New York 14853-0999.*

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MYCOPHAGOUS MIRIDAE? ASSOCIATIONS OF CYLAPINAE (HETEROPTERA) WITH PYRENOMYCETE FUNGI (EUASCOMYCETES: XYLARIACEAE)

Mycophagy in the mirid subfamily Cylapinae has been inferred, but never demonstrated. *Cylapus tenuicornis* (Say), a North American species of this predominantly tropical group, is widely distributed yet seldom collected. It has been reported from the bark of dead trees and from fungi covering dead wood (Heidemann, 1891; Uhler, 1891; Banks, 1893; Knight and McAtee, 1929). On the other hand, Leston (1961) and Schuh (1974), among others, have suggested that cylapines are predators.

There is little doubt that most Cylapinae live under bark, on rotten logs in association with fungi, and that at least some species frequent pyrenomycete fungi. Schuh (1976) reported observing larger numbers of cylapines under bark than would be expected of a predatory species, while Kelton (1985) reported nymphs and adults of *Fulvius imbecilis* (Say) from a nearly dry pile of poplar logs in Manitoba "feeding on dipterous and small coleopterous larvae and on the other soft-bodied arthropods found in damp areas under the bark or in fungi." And Herring (1976) discussed associations with the polypore fungi *Polyporus caperatus* and *Coriolopsis corcata* inhabited by ciid beetles, whose larvae he supposed them to feed upon. A more complete review of the evidence for predation among cylapines will be given elsewhere (A.G.W., Jr., in prep.).

Predatory habits might be inferred from several lines of circumstantial evidence that are, even in combination, inconclusive. The extraordinary speed and agility of